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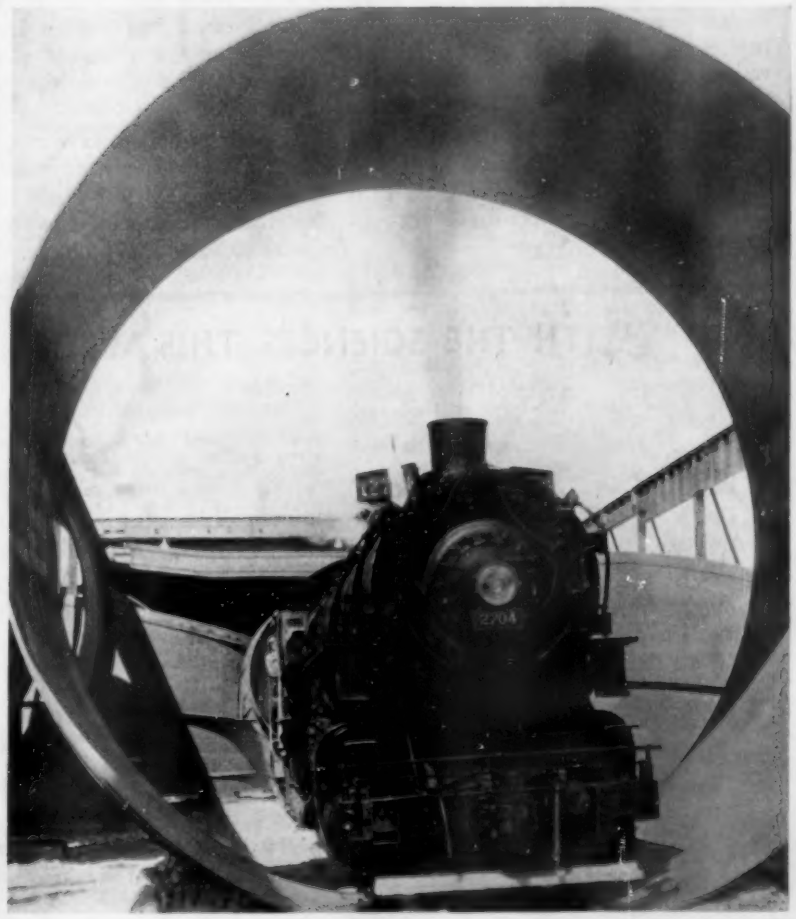
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MAY 5, 1934

Plenty of Room

See Page 281

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXV. *No. 682*

The Weekly Summary of Current Science

Published by

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Edited by WATSON DAVIS

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DO YOU KNOW?

Milk contains more pounds of sugar than of fat.

Doctors will meet in Moscow in May for the fourth international congress on rheumatism.

A kind of sugar dissolved in the pine tree's sap is the essential medium for production of turpentine and rosin.

Several thousand samples of Brazilian woods were collected by a botanist who recently returned from the Amazon tributaries.

Recent experiments show that when disease germs enter the tissues, the body begins to fortify itself against the invaders within 48 hours.

A plant specialist says that there has been more progress in date culture in the United States in twenty years than Old World date growers made in twenty centuries.

A Chicago skyscraper is to be completely air-conditioned.

Arizona residents are writing letters on copper to promote the state's leading industry.

The beech bark disease has destroyed a third of Nova Scotia's forest stand of beech timber.

The chief problems of raising plants in modern houses are summed up as: dry air, improper temperatures, and insufficient light.

The U. S. Bureau of Plant Industry recently exhibited golden bantam corn frozen on the cob last summer and cooked on the cob in March.

Dried skim milk, a very useful food item, has never been popular in grocery stores because it was likely to cake and spoil; but a new, moisture-proof bag appears to solve the problem.

WITH THE SCIENCES THIS WEEK

ANTHROPOLOGY

Were the Goths high-brows or low-brows? p. 277.

ARCHAEOLOGY

Was the stone sculpture of Ur 5,000 years ago very beautiful? p. 284. *Ur of the Chaldees—C. Leonard Woolley—Scribner's*, 1930, $2.50.

ASTRONOMY

How are the speed records of stars measured? p. 282.

How is reflection of sound avoided? p. 286.

What gas dominates the atmosphere of the outer planets? p. 281.

Where is Nunki? p. 278.

BACTERIOLOGY

What do nitrogen-fixing bacteria feed on? p. 281.

BIOLOGY

How do plants become anesthetic? p. 283.

BOTANY—GEOLOGY

Do plants build rocks? p. 276.

CHEMISTRY

How is charcoal made? p. 277.

EPIDEMIOLOGY

What has the weather to do with sleeping sickness? p. 277.

ETHNOLOGY

How old is the nudist problem? p. 280.

FLORICULTURE

How long can poinsettias be kept? p. 279.

GENERAL SCIENCE

Who received the first Walcott medal? p. 275.

GEOLOGY

What caused the "Bays" of Carolina? p. 276.

MEDICINE

Does standing all day injure the health? p. 282.

What, besides alcohol, causes alcohol neuroses? p. 281. *Alcohol, Its Effects on Man—Haven Emerson—Appleton-Century*, 1934, $1.

What electrical charge does diphtheria toxin carry? p. 275.

Why does thyroid removal relieve the heart? p. 283.

METEOROLOGY

Can a volcano produce ice? p. 284.

How much energy does lightning waste? p. 280.

PHARMACY

Where is the new American Institute of Pharmacy? p. 283.

PHYSICS

What idea may explode the "exploding universe" theory? p. 280.

Why are the numbers 136 and 137 interesting? p. 276. *The Nature of the Physical World—A. S. Eddington—Macmillan*, 1929, $3.75.

PLANT PHYSIOLOGY

What is a plant's efficiency? p. 281.

PHYSIOLOGY

What is auxin? p. 280.

VOCATIONAL GUIDANCE

How can employers aid in vocational adjustment? p. 285. *After the Shutdown—E. Clague, W. J. Couper and E. W. Bakke—Institute of Human Relations, Yale*, 1934, $2.

ZOOLOGY

How many legs has a thousand-legger? p. 285.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied at Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

MEDICINE

Chemical Barrier Holds Toxin From Reaching the Brain

Diphtheria Toxin Among Those Excluded; Blood Will Carry Cobra Venom and Dysentery Toxin Past Barrier

DIPHTHERIA toxin, commonly believed to produce its often deadly effects by poisoning the nerve-centers in the brain, is actually prevented from reaching the brain by a chemical mechanism termed the blood-brain barrier.

The injurious or fatal effect of the toxin is due instead to its action on the nerve fibers outside the brain which control the blood vessels. This action is best counteracted by hot baths, state Drs. Ulrich Friedemann and A. Elkeles in reporting their new theory of the diphtheria toxin's action to *The Lancet*.

Dr. Friedemann is the late Director of the Infectious Diseases Department, of the Rudolf Virchow Hospital, Berlin, and Dr. Elkeles is the late chief assistant of the Department. The extensive researches on which their new theory is based were continued in the laboratories of the Medical Research Council of Britain after the German doctors had to leave Berlin.

In their investigations as to whether or not toxins are kept from passing directly from the blood to the brain the physicians experimented with seven toxins. These included the poisons that are produced in diphtheria, botulism (the disease caused by an organism often present in canned food), tetanus or lockjaw, lamb dysentery and cobra venom. The botulism toxin, like that of diphtheria, they found, does not penetrate the blood-brain barrier. Tetanus toxin was already believed to reach the brain by way of the nerves, and not through the blood, and the doctors give reasons for thinking it is unable to pass through the blood-brain barrier.

The dysentery toxin and cobra venom, however, do pass the barrier. A very interesting point is that these two toxins act almost immediately while the others, which are found not to pass the barrier, have comparatively long periods of incubation.

The electrical condition of these toxins, when present in living blood, was also investigated. The discovery was made that the diphtheria, botulism and tetanus toxins each carried a negative charge, while the cobra venom carried a positive charge and the dysentery toxin was electrically neutral. To Drs. Friedemann and Elkeles it thus appears that the blood-brain barrier is impervious to toxins that carry a negative charge and perhaps only to such toxins. They believe, however, that the majority of toxins fall into this group.

Science News Letter, May 5, 1934

GENERAL SCIENCE

Researcher on Peking Man Honored by Academy

HONORED after his death by the National Academy of Sciences, Dr. Davidson Black, Canadian-born scientist who achieved fame in distant China through his researches on the skull of ancient Peking Man, was given the posthumous award of the Elliot Medal for 1931, which carries with it a cash honorarium of $200. Dr. Black was designated to receive the award before his death in Peiping on March 15; the medal and check were placed in the hands of Dr. Frank Dawson Adams, foreign associate of the Academy, on behalf of Dr. Black's widow.

The first award of the Charles Doolittle Walcott Medal and honorarium of $1,350 was made to Dr. David White of the U. S. Geological Survey, in recognition of his work on the pre-Cambrian algae of the Grand Canyon of Arizona, which are among the very oldest of plant fossils.

Other honors bestowed by the Academy were: the Agassiz Medal, awarded to Dr. Bjorn Helland-Hansen of the Geophysical Institute, Bergen, Norway; the Public Welfare Medal, awarded to Dr. David Fairchild, formerly of the U. S. Department of Agriculture; and the Elliot Medal and honorarium of $200 for 1930, awarded to Dr. George Ellett Coghill, Wistar Institute of Anatomy and Biology, Philadelphia.

Science News Letter, May 5, 1934

HONORED

The first award of the Charles Doolittle Walcott Medal pictured below and its attendant honorarium of $1,350 were made by the National Academy of Sciences to Dr. David White of the U. S. Geological Survey in recognition of his research on the pre-Cambrian algae of the Grand Canyon of Arizona.

PHYSICS

Relativity, Quantum Theories Reconciled by Eddington

Complete Ignorance Impossible, He says; Even When Position of Particle is Unknown the Uncertainty is Limited

THE UNIVERSE as a whole shook hands mathematically with the realm of the infinitesimal, as Sir Arthur Eddington, the British universe-maker, acted as master mind and introducer before the meeting of the National Academy of Sciences.

The unification of the relativity theory and the quantum theory was Sir Arthur's task. He took the universe as pictured in formulae by Einstein and others, himself included. He took the mathematical picture of the sub-atomic world of the quanta. He brought them together.

It is difficult, nearly impossible, to put what he has done into words. Sir Arthur says so himself. It is a matter of expressing the constants of the universe and of gravitation in terms of the electric charge and mass of the electron. The mathematical language of astronomy is translated into the language of sub-atomic physics.

One of the strange ideas used is that in the universe of relativity mass is associated with the curvature of space and that in a flat, purely Euclidian space there would be no mass or matter. To get at the mass in the realm of the quantum theory, Sir Arthur used what he called a "short cut." He dug out the mass by means of the use of the famous uncertainty theory, which says that the mass of a particle can be known only if there is uncertainty about its position.

Uncertainty Limited

There is a limit to the uncertainty of the position of a particle in the universe even if it is totally unknown. Sir Arthur used an analogy that might have referred to the present Dillinger pursuit. The authorities, he said, might know absolutely nothing about where an escaped criminal is located, but they can locate him within some 12,000 miles because he must be on the surface of the earth. So Sir Arthur locates the particles whose mass is desired as somewhere in the universe, with a certainty of a few thousand million light years. With this limit to the uncertainty he is able to derive without the aid of experiment values of the electron and proton that agree closely with those obtained by experiment.

The electric charge on these particles originates in the division of the universe's mass into a large number of particles, Sir Arthur explained. The charge comes when there are at least two particles and it can not exist when there is only one.

There is one incidental philosophical observation from Sir Arthur's uncertainty procedure: "You can not produce complete ignorance."

The numbers 136 and 137 bob up in the intricate equations as specially significant and interesting numbers. They are expressions of the degree of freedom involved, the ways that things can be considered and arise from out of the properties of the particles.

Sir Arthur gave credit to Prof. P. A. M. Dirac of England and Dr. Hermann Weyl, now at the Institute for Advanced Study, Princeton, for their work upon the problem of uniting the relativity and quantum theories.

Science News Letter, May 5, 1934

BOTANY-GEOLOGY

Plants of Hot Springs Aid in Rock Formation

PLANTS that build rock formations were described before the meeting of the National Academy of Sciences, by Prof. William Albert Setchell of the University of California. In spite of their massive activities, the plants themselves are very humble, being only thread-like algae, relatives of the slimy scums common on stagnant water.

The plants studied by Prof. Setchell are those of the hot springs. They extract minerals from the hot water, especially lime and silica. With the flinty silica, at least, they form shells about their bodies, within the layers of jelly-like stuff which they secrete. The extracted lime, in other springs, is deposited in crumbly masses. But in all cases the work of the plants seems to be that of active extractors, not merely of passive and inert objects on which the minerals deposit themselves. Their activity seems to be associated with the possession of the food-forming pigment, chlorophyll; though most of these plants are not visibly green because of their possession of other color-bodies that mask the chlorophyll.

Not all the plants that exist in hot springs aid in forming rock. Some deposit no mineral matter at all. There is one species, living in the hottest parts of the springs, that deposits crystalline sulfur when the water contains lime, but it does not separate out the lime.

Science News Letter, May 5, 1934

GEOLOGY

Supposed Meteorite Scars Called Ancient Lake Beds

THE "BAYS" of the Carolina coastal plain, which are great elliptical depressions lately called the result of a monster bombardment with fragments of a comet in some past age, were declared to be nothing more than shallow lake beds with sandy rims raised by the wind, by Prof. Douglas Johnson of Columbia University, speaking before the meeting of the National Academy of Sciences. (*See SNL, April 1, 1933, p. 202*)

The sand of the rims was derived from the sandy borders of the former lakes, Prof. Johnson said, and characteristic effects of wave erosion are still traceable in places, although the lakes are now for the most part filled with bog deposits, thickly overgrown with vegetation.

The longer axes of these elliptical "bays" are in general parallel, and this fact has been held up as evidence for the arrival from space of a flock of meteorites or a small comet made up of stony or iron fragments, crashing into the earth in one tremendous shower. But this parallelism, the speaker believes, was caused by wind control, as was also the varying breadths of the surrounding rims. He could detect no evidence that their formation was due to wave or current action.

Science News Letter, May 5, 1934

Freezing bread with "dry ice" to keep it fresh is the latest trick of the baker's art, reported to *Die Umschau*. When the bread is thawed out again it is as good as new, it is claimed. A patent on the process has been applied for.

EPIDEMIOLOGY

Encephalitis Outbreak Possible During Summer

Public Health Authorities Believe New Epidemic of Sleeping Sickness Will Not Strike St. Louis This Year

BECAUSE of the possible occurrence of encephalitis in other communities during next July, August and September, Dr. David P. Barr of St. Louis pointed out salient features of the epidemic occurring in his city last summer for the benefit of physicians from all over the country at the meeting of the American College of Physicians.

Dr. Barr explained that these outbreaks, if they occur, may be of similar character and of greater or less severity than the St. Louis epidemic which involved about 1,000 of the population in that area.

One location where the disease will probably not occur next summer is St. Louis, in the opinion of health authorities. Another factor, about which little is known, but which may influence the occurrence of the disease is climate.

The summer of 1933 in St. Louis was unusually hot and dry, Dr. Barr reported. June was the hottest ever recorded and the rainfall in June, July and August was the lowest in the history of the city. A prolonged drought followed heavy spring rains.

Similar climatic conditions prevailed at the time of a similar outbreak of encephalitis in Japan a few years ago. Health authorities do not yet know, however, whether there is any but coincidental relation between the climate and the appearance of the disease.

Caused By Virus

The disease is caused by a filterable virus. Blood of patients who recovered from the disease, and to a lesser extent of doctors and nurses who were exposed to it but did not get sick, contain properties that neutralize the effect of the causative virus, Dr. Barr said.

In the St. Louis outbreak the disease was fatal in one out of five cases, but the death rate was much higher in persons over forty than those under forty years of age. Most of the deaths were attributable in part to complications, chiefly pneumonia. Kidney disease, high blood pressure and hardening of the arteries when present before the onset of encephalitis seemed to play a role in lessening the chances of recovery.

One favorable aspect of the disease as it occurred in St. Louis is that the nervous changes generally following in the wake of encephalitis have not so far appeared in patients who recovered.

"It is of special importance," Dr. Barr said, "that examination of many patients three months after the epidemic revealed no new symptoms referable to encephalitis and no evidence of progression of the disease."

Science News Letter, May 5, 1934

CHEMISTRY

Cheaper Process for Making Charcoal From Wood Waste

PATENT for an improved process of making charcoal, believed to be the cheapest possible method of obtaining this product from wood waste, has been granted to Prof. O. F. Stafford, head of the University of Oregon chemistry department.

The improved process involves the feeding of a stream of chipped wood and sawdust into a rotating cylinder, where the material is dried and carbonized by heat produced principally as a result of the burning of the combustible carbonization products of the wood itself. The method makes no attempt to recover any of the other by-products of wood waste, and was perfected chiefly because of expense involved in making charcoal as only one of the products.

The Stafford process differs from similar processes by incorporating a device which permits the carbonizing material to be protected from furnace gases containing hot free oxygen, while at the same time permitting the combustible decomposition products of carbonization to burn and thereby supply the heat necessary for the drying operation.

Prof. Stafford began work upon an improved method of utilizing wood wastes by carbonization about twenty years ago at the university as a research project. By 1916 this work had led to the discovery of a continuous process for the carbonization of such material, which involved not only the formation of charcoal but the recovery of all other carbonization products. The Stafford process was tried out on a semi-commercial scale and was installed commercially in a large plant in the South. Later a still larger installation was built at the plant of the Ford Motor Company at Iron Mountain, Michigan.

It was while working on the carbonization project that Prof. Stafford attacked the problem of producing charcoal from waste wood in the cheapest possible way without regard to other by-products recovery.

Science News Letter, May 5, 1934

GOTHS WERE HIGH-BROWS, TOO

A high-brow Goth sounds paradoxical to us, accustomed as we are to thinking the worst about "Goths and Vandals." But archaeologists, exploring in Crimea, have evidence that Gothic nobility set store by high foreheads. Careful mothers of high born children wrapped the pliant heads tightly and arranged cradle boards so that young skulls attained a noble loftiness. Commoners remained "low-brows" from birth to death. A joint expedition from the University of Pennsylvania Museum and the State Museum for the History of Material Culture in Leningrad discovered the skulls shown above in catacomb burials in a city believed to be ancient Duros, fortified Gothic capital about 600 to 800 A.D. Eugene Golomshtok, field director of the Museum expedition, is shown pointing to an artificially made high-brow Gothic skull in contrast to the skull of a commoner.

ASTRONOMY

Nunki Meets the Moon

May, Which Brings to View First Part of Summer Constellation, Scorpius, Also Provides Occultation

By JAMES STOKLEY

NEXT TO THE daily rising and setting of the sun, the most conspicuous of all astronomical motions are probably the continually changing phases of the moon. We have all watched Luna on successive nights, have seen her appear first in the western twilight as a narrow crescent, setting soon after the sun, as she will about the 15th of this month.

Then the crescent has grown larger, until it has reached first quarter (during May on the 21st); and then, about a week later, it is full, rising in the east as the sun sets in the west, and remaining visible all night. Next it goes to last quarter, when one has to be about in the small hours to see it, and finally, 29 days after we first saw the crescent in the west, it is back there again.

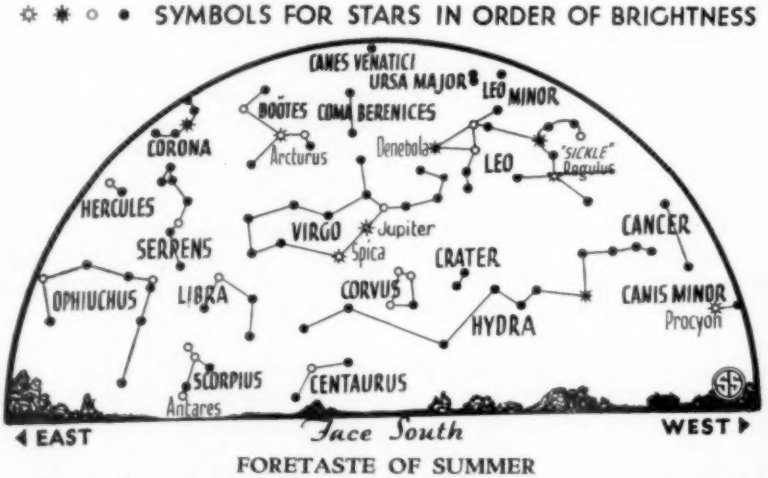
Of course, these changes are due to the fact that the moon has no light of its own, but is illuminated solely by the sun. When it is in the same direction from the earth as the sun, all of the bright half is turned away from us, it is "new moon" and then it is invisible, even if it were possible to see it in the glare of the sun. When it comes directly between the sun and earth, an eclipse is the result, but generally the three bodies are not quite in line, so eclipses are rather rare phenomena. All the time, the moon is travelling in its orbit around the earth. A couple of days after the true new moon, the illuminated hemisphere has turned slightly around towards the earth. At the same time the moon has passed a little to the east of the sun, so we can see the edge of the bright half in the west just after sunset. This is the narrow crescent. At first quarter we see half of the lighted part, or a quarter of the entire surface. When it is full, the moon and the sun are in opposite directions from the earth, and all of the sunlit portion comes into view. Then the cycle reverses until the moon is new again.

Because of the conspicuous nature of these changes, they were perhaps the first natural events noted by primitive man to mark a unit of time longer than the day, and this is the origin of the month. The earliest calendars were probably based on the moon, as is the Mohammedan calendar, which is still in use by the millions of adherents to that religion. Unfortunately, there is not an even number of lunar months in the year, which is the time required for the earth to make a complete journey around the sun. In the Mohammedan calendar, there are twelve months per year. However, the number of days required for the moon to return to the same phase is also uneven; it is about 29½. The Moslems take care of this by having months alternately of 29 and 30 days in length, but this makes a year of 354 days, 11 days shorter than ours. Hence in about three of our years, it is a month behind, so that any Mohammedan month may come at any season of the year. Also, when a Mohammedan says that he is 68 years of age, he has seen only 66 summers. The year 1 of the Mohammedan cycle began with the Hegira, when Mohammed made his flight from Mecca. This was on July 16, 622 A.D. The current year is 1353 in the Mohammedan era, and it began on April 15.

The Gregorian calendar, which we use, and its predecessor, the Julian, differ diametrically from the Mohammedan, because they are based exclusively on the sun and its apparent movements through the sky, ignoring the moon completely. Such a calendar has the advantage that it keeps step with the seasons, and we always know, for example, that this month of May will be in the spring. Other calendars, such as that in use by the Jews, are combinations of the two.

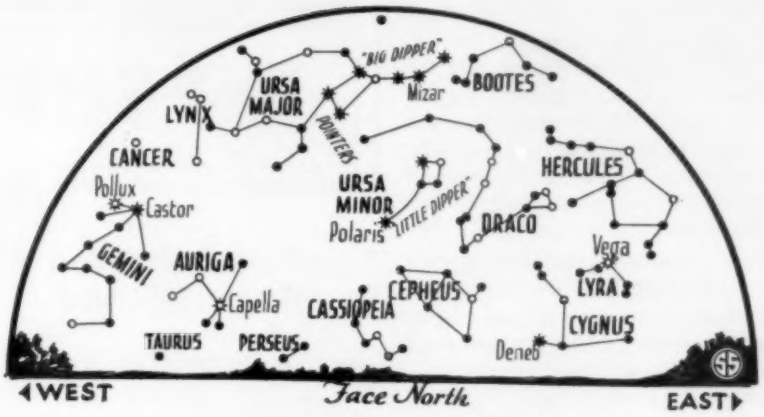
Even though, to us, the moon no longer has the chronological importance that it had in earlier times, many people are concerned with it in another way, because it is the motion of the moon that principally regulates the tides. But the rest of us, lacking even this connection, still find the moon a fascinating thing to watch as it goes through its regular cycle of changes. To the astronomer, its motion is of immense importance, and because the sun and all the planets have their effect in pulling it first one way and then the other, the exact motion of the moon is one of the most complicated of astronomical problems.

An eclipse of the sun is caused when the moon comes between us and the sun, an event that does not happen this year under conditions that will enable it to be seen from the United States. But on May 30 there will be an eclipse of another kind—the astronomer calls it an "occultation"—when the moon will hide the second magnitude star sigma Sagittarii, sometimes called "Nunki." The constellation of Sagittarius rises late in the evening, after Scorpius. After that heavenly arthropod is above the southeastern horizon, you can see his long tail curving around to the east like a great fish-hook, with



FORETASTE OF SUMMER

Low in the southeast may now be seen the first part of the summer constellation, Scorpius, with its red star Antares. Directly south is the great planet Jupiter, more brilliant than any star and glowing with a steady light.



DIPPERS BIG AND LITTLE

The pointers of the big dipper help you to locate the North Star, Polaris, which is the end of the handle of the little dipper. If you follow the curve of the handle of the big dipper, you will come to the bright Arcturus.

the point upwards. Just to the east of the tail, appears a group of stars sometimes likened to a tea-pot, with the spout of the pot over the scorpion's tail. On the other side of the pot is the handle, consisting of four stars, and above it is the top of the lid, marked by a fifth star. These five also form the so-called "milk dipper," the four in the quadrilateral marking the bowl, and the fifth the end of the handle. The dipper is turned down, as if emptying. Nunki is in the bottom of the bowl, nearest the handle.

As seen from Washington, D. C., at 11:33 p. m., Eastern Standard Time, May 30, the moon will pass over Nunki, and a little over an hour later, at 12:45 a. m., May 31, the star will reappear from behind the opposite edge or limb of the moon. As the moon will be only two days after full, it will be quite bright, and the star will not be as easily seen as if it were in another part of the sky. With the aid of a small telescope, or even a pair of binoculars, the occultation can be observed. It will be an interesting spectacle. It will happen a little earlier to the west of Washington, and later to the east. In the Far West, the moon will not quite cover the star.

Disappears Abruptly

When an occultation occurs, the brightness of the star is undiminished until the instant that it disappears behind the edge of the moon; then it vanishes abruptly. Similarly, after the moon has moved on, the reappearance is sudden. This is a striking demonstration that the moon has no atmosphere, because if it had, the disappearance would be gradual, as the light of the star penetrated a greater thickness of air. The effect is especially pronounced when the moon is near the phase of first or last quarter at the time of an occultation. Then the disappearance, or the reappearance, may be from behind the dark part of the moon. This occultation of Nunki, unfortunately, occurs with the moon nearly full.

The Planets Pass

On May 25, the moon will pass by Jupiter, but the two will be quite far apart, about thirteen times the moon's diameter. Venus, which is now the morning star, shining brilliantly in the east before sunrise, will be passed on the ninth, but it will happen when both bodies are below the horizon. Saturn is also a morning star, but comes up several hours before Venus, about 1:00 a. m. in the middle of the month. The moon passes Saturn during the night of May 6, but here also the time of closest approach is before the two objects will have arisen in the United States.

The May evening skies bring a foretaste of summer, for low in the southeast can be seen the first part of the constellation of Scorpius, the scorpion. A little later in the night there may be seen the red star Antares in the center of Scorpius. Directly south, more brilliant than any star, is the planet Jupiter, the steady light of which shows that it is a member of the sun's family of which our own earth is part. Below it, and to the east, is the bright star Spica, in Virgo, the virgin. Almost overhead, in the north, the great dipper can be seen, with the handle pointing over to the southeast. If you follow around the curve of the handle, you will come to the brilliant Arcturus. Low in the northeast shines Vega, in Lyra, the lyre, and still nearer the horizon is Cygnus, the swan, with Deneb, the bird's tail, over to the north.

Leo, the lion, appears high in the southwest. In the front part of his body is the sickle, with the bright Regulus at the end of the handle, and the blade curving round to the west. The blade forms the lion's head. To the east of the sickle is a triangle of stars forming the hindquarters of the lion. The easternmost one, Denebola, is in the animal's tail. Hydra, the water-snake, is below Leo, with the star Alphard, which is about as bright as Denebola.

Some of the stars of the winter sky can still be seen in the northwest. Procyon is almost directly west, marking Canis Minor, the lesser of the two dogs that accompany Orion, the mighty hunter. At the times for which the accompanying maps show the skies, 10 p. m. on May 1, 9:00 p. m. on May 15 and 8:00 p .m. on May 31, the hunter himself, and Sirius, in the greater dog, have passed below the horizon, but they can be seen in the early evening. Capella, in Auriga, the charioteer, is visible farther north, and above, to the north of Procyon, are the twins, Castor and Pollux.

Science News Letter, May 5, 1934

FLORICULTURE

Copper Jars Found To Be Life Savers For Flowers

THE LIFE span of cut flowers can be lengthened by keeping them in copper containers.

This is the discovery reported in Ithaca, New York, by John Ratsek, floriculturist on the staff of the New York State College of Agriculture.

Mr. Ratsek used in his experiments containers which are copper-plated with a recently invented electro-plating finish. He found that the copper added from one to three days to the life of roses, snapdragons, stocks, delphiniums, primroses, carnations and other popular varieties of cut flowers. In one test, poinsettias in the copper container lasted 16 days, as compared to eight days for poinsettias in a tin container.

In accounting for the copper having this effect, Mr. Ratsek explained that tests showed some of the copper from the plated containers dissolved in the water. The copper thus kept the water purer by hindering growth of bacteria and other organisms which cause flowers to decay.

Science News Letter, May 5, 1934

PHYSICS

Idea That Light Leaks Away May Explain Redward Shift

THE NOVEL IDEA that light "leaks away" as it speeds through the intergalactic spaces of the universe was presented to the National Academy of Sciences by Prof. P. I. Wold of Union College, Schenectady, N. Y. It may smash the idea of an expanding or "exploding" universe.

The idea arose from an attempt to explain the redward shift that astronomers have observed in the light of the far distant star aggregations called nebulae. This shifting of the light spectrum lines to the red has been interpreted as being caused by a rushing away of these nebulae outward at tremendous speeds. This is the observational basis of the theory that the universe is expanding.

Prof. Wold first speculated that the velocity of light decreased very slightly with time, instead of being a function of space. This explained the redward shift of light observed without assuming an expanding universe.

This suggestion has now been carried further and has led Prof. Wold to the idea that there is what is called a "photon leak." The photon is the unit of radiation, a gob of light. If velocity of light changes as a function of the time that it has been traveling, then the energy of a photon changes with the velocity. But the momentum of the photon remains constant, the radiation density for a volume traveling with the light wave remains constant and the number of photons passing an observer remains constant. This last suggestion, Prof. World explained, is hard to reconcile with any present picture of the nature of the photon.

Science News Letter, May 5, 1934

PHYSIOLOGY

Hormone From Animals Speeds Flowering in Plants

FEMALE sex hormone, taken from animal glands and purified into a white crystalline form, has been proved to speed the reproductive processes of plants, by two German biochemists, Walter Schoeller and Hans Goebel, of Berlin. It is probable that their experiments will be repeated in America and an effort made to put them to practical application.

The two German biochemists used the female sex hormone usually known in the United States as theelin and by other names, and in Germany called folliculin. Their first experiments were made with the drug as put up for therapeutic use. It brought about a marked acceleration of flower production in hyacinths, onions and corn. Later on, similar results were obtained also with lilies-of-the-valley.

Doubts arose in their minds, however, as to whether the hastening of blooming might not have been due to the powerful growth-stimulating hormone of plants, called auxin, which has been found in animals as well, and in commercial preparations of the female growth hormone.

Accordingly they made a new set of experiments, this time using a crystallized sex hormone, beta-folliculin, which subsequent tests proved to be quite free from auxin. They applied measured amounts of this in water solution to the roots of three calla lilies. Each of the three plants had a matched "twin" plant which got none of the sex hormone; these served as "controls."

In every experiment the flowering was decidedly hastened by the hormone and in at least one experiment the treated plant was in full bloom before any flower bud could be seen on the check plant. The series of experiments were repeated a second time a short time later, with the same result.

Science News Letter, May 5, 1934

ETHNOLOGY

Shows Merrie England Had Nudist Problem

THE NUDIST problem is nothing new. Merrie England back in the fifteenth century had nudists who danced nonchalantly in processions.

Evidence to this effect has been found in a carved wooden panel formerly in Lancaster Castle, showing seven people engaged in a morris dance—one quite unattired. A photograph of the panel has been published in the *Journal of the English Folk Dance and Song Society.*

The photograph indicates what the Puritans in England railed at when they denounced "light, lewde and lascivious dancing" and the greatest abuse of all which they called "dancing naked in nets." The nets, some commentators have thought, were akin to the skin-tight, flesh-colored suits known in modern theatricals as fleshings.

Science News Letter, May 5, 1934

IN SCIENCE

PALEOBOTANY

Seed-Fern Fruits From Southwest Identified

FOSSIL FRUITS of a new genus of seed-fern, originally found in the Hermit shale formation in the Grand Canyon of Arizona, were confirmed as actually belonging to the parent leaves by means of other specimens recently discovered in the Supai formation of the Apache Indian reservation in Arizona. The first specimens contained both fruits and leaf fragments, but their connection was not clear; the newly found material shows the pedicels, or fruit stems, quite plainly.

The extinct plant genus has been named *Supaia,* for the rock formation that was its source, by Dr. David White of the U. S. Geological Survey. Dr. White described the fossils before the National Academy of Sciences.

Science News Letter, May 5, 1934

METEOROLOGY

Thundercloud Charge Picture Upside Down

WE NEED to turn our picture of the lightning charges in a cloud completely over. So said Dr. B. F. J. Schonland, South African meteorologist, when he presented results of his studies of lightning before the meeting of the American Meteorological Society. He is convinced, on the basis of recent observations, that the old idea of a thundercloud as being charged negatively at the top and positively at the bottom is just wrong side uppermost. The negative charge is at the bottom of the cloud, he declared.

Lightning is a terrific expender of energy, Dr. Schonland stated. The annual wastage of energy through lightning discharges, over the whole world, amounts to something over a thousand million kilowatts. His figures for lightning potential in a cloud are just as staggering: ten thousand volts per centemeter of height; or for a cloud a mile high about one billion 580 million volts.

Science News Letter, May 5, 1934

NCE FIELDS

PLANT PHYSIOLOGY

Measure Plant's Carbon Dioxide Fixing Efficiency

TO CAPTURE one molecule of carbon dioxide, the green cell of a water plant requires the energy of 32 quanta of sunlight. A quantum is the fundamental unvarying unit of radiant energy. The experiment in which the engineering efficiency of a living plant cell was determined was reported to the National Academy of Sciences by Prof. B. M. Duggar of the University of Wisconsin.

With his associates, J. F. Stauffer and Farrington Daniels, Prof. Duggar arranged a special apparatus for the task. The central part of the instrument was a closed glass vessel in which a quantity of the one-celled green plant *Chlorella* was kept actively stirred up in water. Through the water carbon dioxide was passed, while light of known energy content was shot through it. The light energy was measured as it entered and again as it left, and the gases that came out of the water were analyzed.

A careful check-up of the data from many experiments gave a figure of 32 quanta for each carbon dioxide molecule absorbed. This value of the efficiency of the cell, Prof. Duggar said, is considerably less than heretofore reported by other investigators.

Science News Letter, May 5, 1934

ASTRONOMY

Methane on Outer Planets Hints They Are Not so Cold

LIFELESS under the feeble rays of the distant sun, the surfaces of the great outer planets have no air as we know it. They have atmospheres—very thick heavy ones at that—but those atmospheres are dominated not by our familiar oxygen-nitrogen mixture but by the noxious compound of carbon and hydrogen known as methane, familiar as the dangerous "fire-damp" of mines, and a constituent of natural gas.

This most recent of the discoveries of planetary astronomy was disclosed at the meeting of the National Academy of Sciences through a telegram sent by Director V. M. Slipher of Lowell Observatory, Flagstaff, Ariz. The tell-tale lines in the spectra of Jupiter, Saturn, Uranus and Neptune were interpreted in considerable part by Dr. Arthur Adel of the University of Michigan.

Presence of massive quantities of methane in the atmospheres of the giant planets has a possible significance for the still unsolved riddle of their surface temperatures, Dr. Henry Norris Russell of Princeton University said in commenting on Dr. Slipher's telegram.

At a temperature of 161.4 degrees below zero Centigrade this gas becomes a liquid, unable to betray its presence through reflected light rays. Of course, under the different gravity and atmospheric-density conditions on the great planets this low boiling point of methane might be different.

But in any case, the data of Drs. Slipher and Adel tend to indicate that the surface temperatures of the outer planets are not so low as it has been the custom to assume in the past.

Science News Letter, May 5, 1934

BACTERIOLOGY

Nitrogen-Fixing Bacteria Work Best When Well Fed

NITROGEN-FIXING bacteria that live in nodules on the roots of clover, beans, and similar plants become more abundant and work more effectively when their host plants are encouraged to form more carbohydrates, or foods of the sugar-starch class.

This is the gist of the report presented before the meeting of the National Academy of Sciences by Drs. E. B. Fred and P. W. Wilson of the University of Wisconsin.

The two experimenters controlled the rate of carbohydrate formation in a number of ways. They gave their plants an over-supply of carbon dioxide to convert into food. They reduced the quantity of nitrogen in the atmosphere. They varied the oxygen supply. Finally, they added nitrogen compounds, both with and without extra carbon dioxide.

"The results of all these studies were consistent," Drs. Fred and Wilson stated, "and showed that the carbohydrate-nitrogen relationship is an extremely important although not the only factor in the various functions of symbiotic nitrogen fixation."

Science News Letter, May 5, 1934

ENGINEERING

Big Pipes Are Used In Boulder Canyon Project

See Front Cover

THE PHOTOGRAPH on the front cover of this week's SCIENCE NEWS LETTER shows graphically the size of things at the Boulder Canyon project. The locomotive is passing through a section of steel pipe, 30 feet in diameter, which has been prepared for laying in the Upper Nevada Tunnel. The picture was taken by the Bureau of Reclamation, U. S. Department of the Interior at the Babcock and Wilcox Company plant.

Science News Letter, May 5, 1934

MEDICINE

Find Lack of Food Cause Of Alcoholic Neuritis

THE SERIOUS nervous disease resulting in paralysis and often in death which afflicts persons partaking too freely of alcoholic beverages is due to lack of food and not, as generally believed, to a poisonous effect of the alcohol on the peripheral nerves of the body, Dr. Maurice B. Strauss of Thorndike Memorial Laboratory, Boston, reported to the American Society for Clinical Investigation.

Six patients suffering from the disease got well when forced to eat certain foods, although they were allowed to go on drinking their customary amounts of alcoholic beverages.

"In general the daily intake of these patients varied from one pint to one quart of 100-proof whiskey," Dr. Strauss said in describing his experiment with them.

At the same time each patient was compelled to eat a nutritious diet, particularly rich in red meats, fruit and vegetables. Vitamin B concentrate was injected into their muscles.

The fact that they all recovered Dr. Strauss presented as evidence that the disease is due to dietary deficiency and not to the poisonous effect of the alcohol on the nerves.

The experiment was undertaken to test a theory developed by Dr. Strauss and Drs. George R. Minot and Stanley Cobb of Boston, that the disease is due to failure of chronic alcoholics to eat sufficient food of the right sort and that in certain instances these persons are unable to absorb or utilize certain food substances.

Science News Letter, May 5, 1934

MEDICINE

"Don't Worry" is Secret Of Long Life and Health

Aged Man in Perfect Health Has Been Happily Married For Nearly Six Decades; Abstains from Liquor and Tobacco

THE SECRET of how to live long and be healthy can be told in two words, "Don't worry."

Dr. Francis G. Benedict of the Carnegie Institution's nutrition laboratory and his associate, Dr. Howard F. Root, learned that this is the way to a healthy, active old age by studying a living example of ideal old age, Mr. Seth W. Lincoln of Worcester, Mass. Their studies were reported at meetings of the National Academy of Sciences in Washington and the American Society of Clinical Investigation in Atlantic City.

Years of Hard Work

At ninety-one years, Mr. Lincoln is a man of alert manner and upright carriage without the stoop of old age. His movements are active, free and quick. His voice is strong and his hearing good. His left eye has relatively little vision but the removal of a cataract from the right eye at the age of eighty-five has left him keen enough eyesight to traverse the business streets of Boston alone without a cane. He still carries on his work at the publishing house with which he has long been connected. Years of standing at a type case with consequent confinement have apparently not affected his general health. The normal texture of his skin and hair, and the absence of the thickness and dryness of skin usually seen in old age, indicate that his endocrine glands are in extraordinarily good balance. He has enjoyed fifty-nine years of romantic married life.

His vital processes go on at a relatively slow pace, considering how active and vigorous he is. This the scientists interpret as meaning "that his body machine is working with extraordinary efficiency and that when it is not performing muscular work it resembles an automobile engine while idling, that is, it is idling with an extremely low consumption of power."

Comparing the rate at which Mr. Lincoln's body converts fuel into energy with that of two other striking examples of men who maintained health and vigor past the age of ninety, the British alienist, Sir James Crichton-Browne and the late Dr. W. W. Keen, eminent American surgeon, indicates that these two men were continuously burning their fires under forced draft, whereas in Mr. Lincoln's case the fire is well banked to burn more slowly and economically.

An outstanding feature in Mr. Lincoln's personal history is that he has never suffered any great sorrows and has never experienced any tremendous financial stress, although he has had to earn his own living.

"He has a most optimistic outlook on life, spreads cheer and happiness wherever he goes, and is deeply religious," Dr. Benedict said.

Most of his family were long-lived though none has lived as long as Mr. Lincoln himself, and to this factor of good family history the scientists attribute part of the responsibility for Mr. Lincoln's own remarkable longevity.

Teetotaler

"Mr. Lincoln eats a rational diet, not at all one-sided or dominated by any of the food fads," Dr. Benedict reported. "He has always abstained from the use of alcohol and tobacco, eats sparingly of eggs and liberally of fruits."

While no rules can be laid down on the basis of this one man's experience, Drs. Benedict and Root believe that Mr. Lincoln's example makes a pretty strong case for healthy living habits, good family history and freedom from worry with a happy outlook on life as the means of achieving healthy, vigorous old age.

Because of the apparent importance of mental poise and an unharassed mind, the scientists suggest that the psychologist will in future play as big a part in helping people prolong their lives beyond the biblical three score and ten years as the physician who teaches proper habits of eating and drinking and hygiene.

YOUNG AT 91

Seth W. Lincoln, of Worcester, Mass., who has been studied because of his perfect health by Dr. Francis G. Benedict, of the Carnegie Institution of Washington's Nutrition Laboratory.

ASTRONOMY

New Device To Aid Star Speed Studies

BETTER understanding of stellar traffic, especially of the stars that are speeding straight away from us or straight toward us, may result from the use of a new device invented by Prof. R. W. Wood of the Johns Hopkins University, and described by him before the National Academy of Sciences.

The speed of a receding star is measured by splitting up its light into a spectrum, or "artificial rainbow," and measuring the displacement or shift of certain lines in it toward the red. Such measurements have in the past had to be done very tediously, one star at a time through a narrow slit over the end of a telescope.

Prof. Wood's device consists of a number of diffraction gratings, which are flat pieces of glass with exceedingly fine lines ruled close together on them. These break up the light into a spectrum, just as a prism does. Diffraction gratings were invented by Prof. Wood's predecessor in the physics department at the Johns Hopkins University, Prof. Henry A. Rowland.

Prof. Wood has succeeded in making gratings suitable for placing in groups on the face of a telescope's big lens, with prisms back of them to give cor-

rect adjustment to the spectra they transmit. In this way the spectra of whole star clusters can be photographed at once, instead of just one star at a time.

At the same time, the actual image of the star itself is photographed on the same plate, using parts of the lens not covered by the gratings. The star-images and their spectra can even be superimposed if desired. Thus a "mass production" method of obtaining important astronomical data may be developed, replacing the older method of one-by-one production.

Science News Letter, May 5, 1934

BIOLOGY

Anesthesia Produced By Distilled Water

DISTILLED WATER, replacing ordinary tap water containing its usual quota of highly dilute mineral substances, produces anesthesia in plant cells, seemingly by dissolving out of them some unknown organic stuff.

This observation was presented to the National Academy of Sciences by Dr. W. J. V. Osterhout and Dr. S. E. Hill of the Rockefeller Institute for Medical Research.

Degrees of sensitivity and of its opposite, anesthesia, in living cells can be measured by suitably arranged delicate electrical apparatus. When very long cells of the water plant *Nitella* are placed in distilled water they presently become completely anesthetic, transmitting no nerve-like variations in electric potential along the protoplasm. This loss of sensitivity is hastened by the addition of acids or alkalis, but slowed by the addition of calcium. The anesthetic state passes off again when the cells are replaced in tap water.

"The simplest explanation," suggested Dr. Osterhout, "is that an organic substance, which we may call R, is dissolved out of the surface by distilled water, and this takes place more rapidly in the presence of acid or of alkali but more slowly in the presence of calcium."

This anesthetic state in plant cells has been observed in nature at certain times of the year, Dr. Osterhout added. This would lead to the supposition that the R substance is produced more slowly than it is dissolved out by the pond water.

"It seems possible," he concluded, "that other cases of anesthesia may be due to the fact that substances are removed from the cell."

Science News Letter, May 5, 1934

MEDICINE

Relief of Pain on Thyroid Removal Due to Cutting Nerves

THE PAIN of angina pectoris and congestive heart failure may be relieved in some patients immediately after operation for complete removal of the normal thyroid gland, Dr. H. L. Blumgart of Harvard Medical School and Beth Israel Hospital, Boston, reported at the meeting of the American Society for Clinical Investigation.

Surgeons should not be misled by this immediate relief of pain, since its cause is temporary. Permanent relief cannot be had until there has been time for the metabolic rate to be reduced as a result of removal of the thyroid, Dr. Blumgart emphasized.

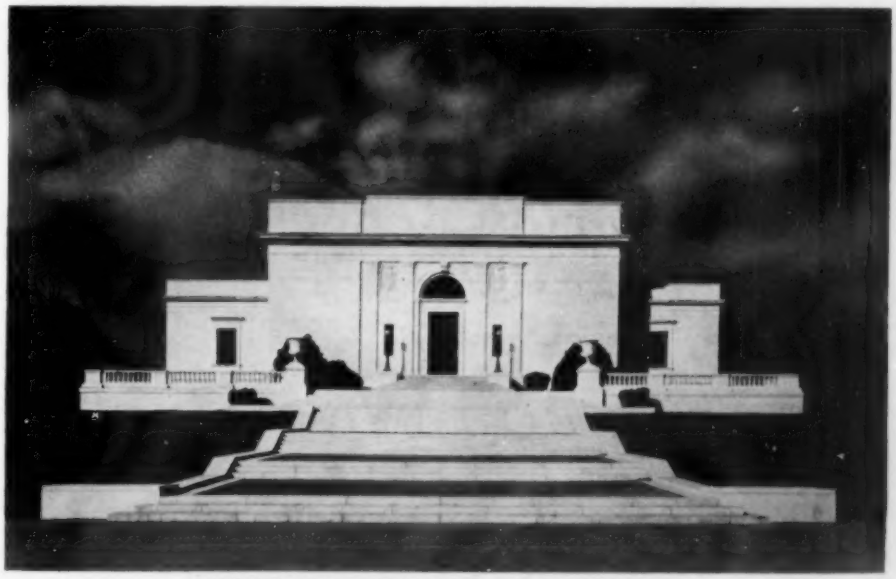
This now famous operation was devised by Dr. Blumgart and Drs. S. A. Levine and D. D. Berlin to lessen the load of the overworked heart or weakened arteries in pumping and carrying the mass of blood to the tissues. The amount of work the heart must do depends primarily on the call of the tissues all over the body for oxygen. This in turn is governed by the thyroid gland which determines the metabolic rate or the rate at which the body processes requiring oxygen go on.

When this rate has been reduced consequent on removal of the thyroid, permanent relief of the pain is achieved, but until tests shows that the rate has been lowered, patients should be kept at rest in bed, even though they feel much better, Dr. Blumgart said.

This permanent relief was expected to follow complete thyroid removal, but relief was experienced by the patients much sooner than expected. Dr. Blumgart and Drs. A. A. Weinstein, D. Davis and J. E. F. Riseman have spent over a year studying this aspect of the treatment. They found that the immediate relief was due to the fact that the surgeon, in removing the thyroid gland, interrupts nerve pathways which carry painful sensations from the heart to the central nervous system.

"With this early relief that occurs before the metabolic rate becomes lowered there is probably no fundamental change in the heart condition," Dr. Blumgart explained. "So the importance of keeping patients in bed after the operation, in spite of their sense of well being, until the metabolic rate falls, is to be emphasized."

Science News Letter, May 5, 1934



AMERICAN INSTITUTE OF PHARMACY

This beautiful edifice just completed stands on Constitution Avenue in Washington, next to the National Academy of Sciences. It will be dedicated "to those who have given of their thought and endeavor to the improvement of public health and to the further advancement of science in pharmacy" during the meeting of the American Pharmaceutical Association May 7 to 12, 1934.

METEOROLOGY

Remote Volcanic Eruptions May Affect Weather

WEATHER changes that visit blessing or bane on the tulip bed in your front yard and the sprouting radishes in your back garden sometimes receive substantial contributions from the remotest-seeming causes. A major volcanic eruption in Java or Alaska may fill the upper air with dust so fine that it will float round and round the world for two or three years before it settles out, and while it is aloft it helps to produce persistently chilly, often rainy weather—and your garden feels the consequences.

This and other effects of great volcanic explosions, such as that of Katmai in 1912 which kept the Iowa corn crop from ripening one or two seasons later, were discussed before the spring meeting of the American Geophysical Union in Washington by Prof. W. J. Humphreys of the U. S. Weather Bureau.

Spite Smoke of Vulcan

Volcanic dust in the upper atmosphere, Prof. Humphreys said, heralds its presence by strange effects on the sunlight as well as on the weather that follows disturbances in the radiations that reach and proceed from the earth. It is as though Vulcan, despised by the other Olympians for being "in trade," were setting up a spite-smoke from his forge, not only interfering with Jupiter's prerogative of ruling the clouds and the lightning, but making driving difficult for young Apollo in his golden sun-chariot.

At such times the sun becomes surrounded with peculiar rings or haloes, resulting from the scattering of its rays by the tiny dust particles. A large proportion of these seem to be actual microscopic bubbles with shells of stone, puffed out like the much-advertised "grains shot from guns," and in exactly the same way, by the sudden expansion of internal steam.

Measured

The angular diameters of these haloes can be exploited mathematically to obtain measurements of these invisibly fine bits of lava, air-borne miles above our heads. These calculations show them to have an approximate diameter of 1.85 microns, Prof. Humphreys said. A micron is a thousandth of a millimeter, and there are roughly 25 millimeters in an inch.

We might even get the paradox of a frozen earth produced by too much activity by fire-mountains. To reduce the intensity of direct solar radiation by 20 per cent., probably not more than one fifteen-hundredth of a cubic mile of volcanic dust, hurled into the upper air every couple of years and kept going a long enough time, would quite suffice. It would not matter even where the volcanoes were situated, so long as they blew their dust high enough to set it afloat around the world. Thus the northern lands might conceivably become ice-blanketed through an active conspiracy of a ring of tropical volcanoes.

Science News Letter, May 5, 1934

ARCHAEOLOGY

Soldier's Grave At Ur Yields Statue of Woman

A STATUE of a rather homely woman 5,000 years old is a discovery of importance from Ur of the Chaldees.

Reporting the discovery to the University of Pennsylvania Museum, Dr. C. Leonard Woolley, field director of the joint expedition to Ur, stated that the stone statue was unearthed in a soldier's grave, and that it lay touching the blade of the bronze axe at the soldier's shoulder. Finding a stone statue in a grave at Ur is unprecedented.

The figure of the woman is ten inches high and is of alabaster, Dr. Woolley stated. Describing it, he said:

"Squat and thick-set, with broad shoulders and head disproportionately large, the woman stands holding her hands before her breast. She wears the traditional garment of sheepskin and her hair, gathered in a heavy roll, is confined by a fillet of lapis lazuli inlay. The eyes are of shell and lapis lazuli and the eyebrows are inlaid with bituminous paste.

"The figure perhaps lacks a full measure of beauty and refinement, but illustrates the extent to which the stone sculpture of the period lagged behind the masterpieces of the goldsmith and the workers in inlay. The fact that it is dated makes it important, however, for it will serve as a basis for the dating of similar pieces and so will go far to round out our knowledge of the art of the golden age of Sumer."

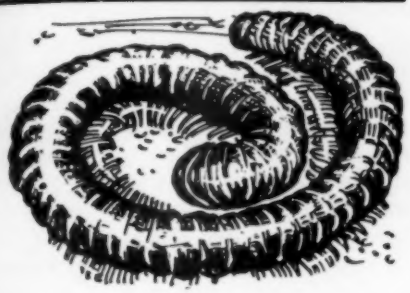
The age of the statue, the oldest piece of stone sculpture in the round so far unearthed at Ur, is said with reasonable certainty to be about 3200 B.C.

Digging at Ur, recently completed, marks the twelfth season of work by the joint expedition of the British Museum and the University of Pennsylvania Museum. The principal goal of this season was to excavate a cemetery of 4000 B.C. or earlier. This cemetery lies 54 feet under the surface, beneath thousands of tons of accumulated debris of later buildings and cemeteries of Ur.

Science News Letter, May 5, 1934

ZOOLOGY

NATURE RAMBLINGS
by Frank Thone



"Thousand-Leggers"

WE OVER-RATE the "thousand-leggers" for both number of feet and wickedness of habits.

The older zoology books used to call them "millipeds," and class them with the centipedes (or "hundred-footers") into a group they called "myriapoda;" but it all came to the same thing: "milliped" is merely Latin, and "myriapod" Greek, for "thousand feet." But whether in Latin or Greek or English, a name that credits these wriggling soil-dwellers with a thousand feet apiece is undeserved exaggeration. They may seem to have a thousand feet when they unexpectedly crawl across the back of your hand, or ten thousand when you try to catch one before he gets back into his sheltering crack in the earth, but a mere three hundred is closer to the actual number. Each average thousand-legger is made up of a head and about seventy-five segments or joints, each of which has four legs.

Like almost every unusual crawling thing, the poor thousand-legger is commonly believed to be poisonous; whereas he really is quite harmless. Even his relative, the house centipede, is not poisonous, or at any rate is unable to bite through the relatively tough human skin. Only the large tropical centipedes are seriously venomous. The centipedes, both large and small, are carnivorous, and prey on insects, but the harmless "thousand-legger" is a vegetarian.

But this badge of inoffensiveness is also the sign of his disgrace. For many of the millipeds do considerable damage to the roots of plants, earning the ill title of false wireworms, by analogy with the true wireworms, which are the larval stages of beetles. In general, a "thousand-legger" in your garden is not to be regarded as a friend.

Popularly, the thousand-legger is usually somewhat loosely classed as "some kind of a bug," and so is his centipede second cousin. But even taking "bug" to mean "insect" (which will make orthodox entomologists squirm as though one were suddenly down their necks) the term is rather wide of the mark. Millipeds and centipedes are members of the same great zoological group that contains the insects, but they are no more nearly related to insects than goldfish are to humming birds, or frogs to elephants. They are sometimes rated as kin to spiders and scorpions, but even this relationship is remote. They are thousand-leggers, and that's all they are.

Science News Letter, May 5, 1934

RADIO

ELECTRON OPTICS

an address by

Dr. C. J. Davisson

Of the Bell Telephone Laboratories, New York City

Wednesday, May 9, at 3:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

VOCATIONAL GUIDANCE

10,000,000 White-Collar Men Must Change Jobs

TEN MILLION men who have been employed on white-collar jobs will be forced to change to manual labor during the next ten years, was an estimate cited by Dr. Morris S. Viteles, of the University of Pennsylvania.

Another 15,000,000 manual workers will find it necessary to transfer to jobs requiring skills other than those to which they have been trained, he predicted. He urged modern psychological methods of vocational study and re-education to meet this great problem of placement.

"In the case of these men there is no time to be wasted in trying out one or another job until by chance each finds that for which he is adapted," Dr. Viteles said. "The rapid adjustment and effective use of this man power require an exact analysis, by appropriate psychological techniques, of qualifications for work. Only in this way can there be sound and rapid re-education and placement of each in accordance with the new needs of industry and with the specific qualifications of each worker involved."

"Traditional notions of vocational fitness must give way to the use of psychological methods in measuring human capacities, temperamental traits, interests and skills that underlie job success," Dr. Viteles declared. He cited work already being done in employment research centers in Minnesota, Philadelphia, and New York, as pointing in the right direction.

"The analysis of individual ability, emotional characteristics, and interests is only the first step in a scientific program for putting displaced labor into new fields of employment," he explained. "This must be supplemented by psychologically sound training programs for teaching men the new jobs for which they are qualified."

The former practice of choosing a vocation and then training for that particular job must be replaced by an attempt to increase general skill and dexterity and by learning various applications of these fundamental abilities. The aid of the psychologist must be enlisted to solve the problem of developing adaptability in the worker. Employers can do their part in this program.

"Industry, for example, can facilitate transfer within the organization by training its experienced workers—particularly the older ones—in the principles and practices of the jobs to which each can be mostly easily transferred in case of replacement of his job by machines, of changes in company practices, or of temporary economic depression," Dr. Viteles said, adding that the practicability of such a program is indicated by training plans already being pushed forward by a number of progressive organizations.

Dr. Viteles' address was broadcast over the Columbia Broadcasting System.

Science News Letter, May 5, 1934

ASTRONOMY

American Planetaria to Test Theories of Acoustics

THOUSANDS of Americans are enjoying their ventures into artificial star-gazing made possible by the two existing planetaria in Chicago and Philadelphia, and in the future Los Angeles and New York will have synthetic "vaults of heaven" upon which glorified light projection will recreate the starry night skies.

In the Griffith Observatory and Planetarium, now building at Los Angeles, the stars are to be projected on a smooth white dome perforated with innumerable small holes, and the dome is to be made of specially treated celotex. This was planned by the late Dr. E. H. Kurth, director of the planetarium.

The Los Angeles plan is a modification of that adopted at the recently completed Fels Planetarium of Philadelphia. There the inner dome is made of stainless steel, also perforated with innumerable small holes. The object of these arrangements is to reflect the light and to allow the sound to pass through.

Methods Used

In the older planetaria this object was secured by making the projection surface of cloth stretched on frames. This has the disadvantage that the dome becomes a series of plane facets, or, as in the Chicago Planetarium, of conical zones one above the other. In the Fels Planetarium the material is formed to the proper curvature so that a truly hemispherical dome is produced. The same will be true at Los Angeles.

The reason why direct reflection of sound from the inner dome must be avoided is that the curved surface would produce focussed echoes. All sounds, disturbing sounds as well as the speaker's voice, would be concentrated at particular points. The same would be true of light if the dome were optically smooth or mirror-like. Each star image would be reflected in one particular direction and could be seen from that direction only. In order that each star projected on the dome may be seen equally well from all parts of the room, the light must be reflected diffusely—equally in all directions. To secure this the surface must be optically rough. But light waves are measured in hundred-thousandths of an inch, so that an "optically rough" surface is exceedingly fine grained and appears quite smooth to the eye. A sheet of paper, for example, is optically rough.

Really Rough

Not so with sound. Sound waves are measured in feet. To avoid mirror-like reflection of sound, the surface must have a roughness measured in feet. This condition is secured in the older planetaria by putting baffle plates behind the cloth so that the sound reflected from the walls beyond is broken up, is reflected in all directions, and more or less evenly distributed. This is the characteristic of a good auditorium. The reflected sound reinforces the speaker's voice.

A different ideal is aimed at in the Fels Planetarium. Sound reflection from the back walls is suppressed by padding, so that the auditorium effect is eliminated, and the spectator has the illusion of being out in a vast open space under the stars. He only hears the speaker's voice direct.

The same illusion is aimed at in the Griffith Planetarium, but it is believed that it will be more effectvely secured. Celotex is itself a good sound absorber, so that any sound that may be reflected from the back walls despite padding, will be stopped in its attempt to get through the holes. Indeed, no padding may be required. The space between the two domes thus forms a sort of sound trap. Sound can get in but cannot get out.

This is the theory; but only experience can show whether it is desirable to suppress all auditorium effect. At any rate, we shall soon have in the United States three planetaria using three different methods of treating the sound problem. It will be interesting to see how they work out in practice.

Science News Letter, May 5, 1934

ZOOLOGY

Water Supply Furnished For Grand Canyon Deer

AMPLE WATER supply for present and future game needs is being provided on the semi-arid south rim of the Grand Canyon through the efforts of the Federal Government in building 15 tanks for storing water. Already five of these tanks have been constructed, the largest being over 200 feet long.

Construction of the tanks, plus a large-scale fencing project already under way, will tend to make the south rim country of the Grand Canyon National Park a more secure haven for all forms of native wild life than has heretofore been possible.

The semi-tame herd of deer, the nucleus of which was introduced from the north rim of the canyon by truck and airplane transportation at different periods, is one of the principal beneficiaries of these game-protective measures. Each of the three does that remain from the original north rim shipment in 1927 raised two fawns last year, making a total of nine fawns raised by each of them. Between 45 and 50 fawns born in 1933 increased the band to about 120. For the first time on record, some of the deer gave birth to their young among the houses of Grand Canyon Village.

Science News Letter, May 5, 1934

First Glances at New Books

Agricultural Economics

THE MAINSTAY OF AMERICAN INDIVIDUALISM: A SURVEY OF THE FARM QUESTION—Cassius M. Clay—*Macmillan,* xii+269 p., $2.50. A lawyer who is also a farm owner tries to think his way through the terrific maze in which American post-war agriculture has found itself, bringing to bear not only a trained man's ability to arrange facts and figures but an average American's natural predilections "fur and ag'in' things" as well. A confessed Democrat, when he encounters the alternative which has since come to be known as "Wallace's dilemma," he leans in the same direction as the present Secretary of Agriculture, who was "raised" a Republican. It is a pity that most of the book was written before the present effort toward agrarian amelioration had begun to unfold itself.

Science News Letter, May 5, 1934

Education

ADMINISTRATION AND SUPERVISION—Fred Engelhardt, William H. Zeigel Jr., and Roy O. Billett—*U. S. Govt. Print. Off.,* 207 p., 15c. What manner of man is the superintendent of schools or the supervisor of high school instruction? This monograph of the National Survey of Secondary Education contains the answer.

Science News Letter, May 5, 1934

Physics

ELECTRICITY—John Pilley—*Oxford Univ. Press,* 348 p., $2.50. A beginners' book which does not claim to be a text for school use. Its aim is to arouse interest in science of electricity by making its logic appear in the clearest possible light. As is usual in British books of this type, there is plenty of good solid material attractively presented for serious reading.

Science News Letter, May 5, 1934

Mathematics

THE MATHEMATICS OF FINANCE—Charles N. Hulvey—*Macmillan,* 306 p., $3. A textbook for students by the associate professor of commerce at the University of Virginia.

Science News Letter, May 5, 1934

Endocrinology

OUR MYSTERIOUS LIFE GLANDS AND HOW THEY AFFECT US—William J. Robinson—*Eugenics Publishing Company,* 291 p., $2.50. The direct forceful style of this book, the short sentences and definite statements will make it appeal to a wide group of lay readers—to whom it is chiefly addressed. As might be expected from the list of other popular books by this author, the emphasis is on sex. Although Dr. Robinson devotes an entire chapter to the relative unimportance of the gonads or sex glands, fully a quarter of the book is devoted to discussion of them, their functions and abnormalities. It is rather surprising to find a section on vitamins in a book about glands. There is a large glossary of terms as well as a chapter explaining some of the scientific terms used in endocrinology and the book is profusely illustrated.

Science News Letter, May 5, 1934

Medicine

MEDICINE—A VOYAGE OF DISCOVERY—Josef Löbel—Transl. by L. Marie Sieveking and Ian F. D. Morrow—*Farrar and Rinehart,* 334 p., $3. The author's idea is that medicine is not merely the art of treating sickness but the science of man as a whole. Consequently in this book he takes up all branches of medical science, giving a cross-section of the whole subject. The result is something quite different from the usual popular books on medicine but nevertheless most readable and interesting.

Science News Letter, May 5, 1934

Biology

SYMBIOSE, PARASITISME ET EVOLUTION (ETUDE MATHEMATIQUE)—V. A. Kostitzin—*Hermann et Cie. (Paris),* 47 p., 15 fr.

Science News Letter, May 5, 1934

Archaeology

THE SPADE AND THE BIBLE—W. W. Prescott—*Revell,* 216 p., $2. An attempt to fit archaeological explorations in Bible lands to a fundamentalist religious viewpoint. In building a case, the author quotes heavily from many works. Most of these are by well known archaeologists and scholars, but some of the authors would be surprised to find the conclusions to which their words are forced to lend support. There are popular accounts of Biblical archaeology which argue less and teach more.

Science News Letter, May 5, 1934

Sociology

NAZISM—Edited by Pierre van Paassen and James Waterman Wise—*Harrison Smith & Robert Haas,* 313 p., $2.50. Of greatest interest to those interested in science are the chapters on *The Debasement of the Professions* by Werner Hegemann, the *Enslavement of Women* by Dr. Alice Hamilton, of the Harvard Medical School, and *The Degradation of Culture* by I. A. Hirschmann. The book is a powerful indictment of the rulers of the Third Reich.

Science News Letter, May 5, 1934

Philosophy—General Science

SCIENCE AND GOD—Bernhard Bavink—*Reynal & Hitchcock,* 174 p., $1.50. The German scientist and philosopher, author of the comprehensive book "The Natural Sciences," summarizes the state of conflict between the material and spiritual schools and as the result asks why should Christianity refuse to make use of the recent revelation of modern science "which God has given us in His nature?" "The theologian," the epilogue of the book says, "no longer needs to fear the presence of scientific literature in the hands of his flock, but may really be glad from the bottom of his heart when they study the wonders of creation, since this study will only make his work easier. For matters are now in such a position that anyone who has understood physics even a little is simply proof against the nonsense of materialism. Such a one will find all the old materialistic arguments, still put forward in proletarian freethinking circles, to be completely stale doctrine; he will find them ridiculous, and act as a centre of healthy thought for his whole environment."

Science News Letter, May 5, 1934

General Science

EVERYDAY SCIENCE—Carleton Estey Preston—*Univ. of North Carolina Press, Bulletin* No. 4, Vol. VIII, 51 p., 50c. An outline for the use of schools and women's clubs. Fifteen meetings are scheduled together with lists of topics and book references.

Science News Letter, May 5, 1934